

WHAT IS CLAIMED IS:

1. A fuel cell stack assembly comprising:

at least a first fuel cell and a second fuel cell electrically coupled together such that at least one sealed passage extends between said first and second fuel cells, each said fuel cell comprising at least one hollow manifold comprising a wall extending between a first end and a second end, each said wall defining a chamber therein, said wall comprising at least one opening extending therethrough in flow communication with said chamber; and

at least one fuel cell isolation device coupled in flow communication with each said fuel cell hollow manifold, said at least one fuel cell isolation device variably positionable during fuel cell stack assembly operation for selectively stopping fluid flow through at least one of said fuel cells

2. A fuel cell stack assembly in accordance with Claim 1 wherein at least a portion of said at least one sealed passage has a substantially circular cross-sectional profile, said at least one fuel cell isolation device has a substantially semi-circular cross-sectional profile.

3. A fuel cell stack assembly in accordance with Claim 1 further comprising a fuel inlet configured to channel fuel to said first, second, and third fuel cells, and a fuel outlet configured to channel fuel from said first, second, and third fuel cells, said at least one fuel cell isolation device positioned within at least one of said fuel inlet and said fuel outlet.

4. A fuel cell stack assembly in accordance with Claim 1 wherein adjacent fuel cells are separated by a distance, said at least one fuel cell isolation device has a length that is longer than said fuel cell separation distance.

5. A fuel cell stack assembly in accordance with Claim 1 wherein at least one interconnect extends between adjacent fuel cells, said at least one fuel cell isolation device is configured to electrically couple a pair of adjacent interconnects together.

6. A fuel cell stack assembly in accordance with Claim 1 wherein said at least one fuel cell isolation device comprises an external surface, at least one of a wire mesh, a metallic seal, and a brush extends outwardly from said external surface.

7. A fuel cell stack assembly in accordance with Claim 1 wherein said at least one fuel cell isolation device is coupled to at least one actuator for controlling movement of said at least one fuel cell isolation device.

8. A fuel cell stack assembly in accordance with Claim 1 wherein each said fuel cell further comprises at least one keyway positioned adjacent at least one of said manifold first end and said manifold second end, said keyway facilitates positioning said at least one fuel cell isolation device.

9. A fuel cell stack assembly in accordance with Claim 1 wherein each said fuel cell further comprises at least one pre-positioned fuel cell isolation device that is movable by an actuator.

10. A fuel cell stack assembly in accordance with Claim 1 further comprising further comprising a fuel inlet, a fuel outlet, and at least one valve, said fuel inlet for channeling fuel to said first, second, and third fuel cells, said fuel outlet for channeling fuel from said first, second, and third fuel cells, said valve for selectively controlling movement of said at least one fuel cell isolation device through at least one of said fuel inlet and said fuel outlet.

11. A fuel cell stack coupled in flow communication to an air source and a fuel source, said fuel cell stack comprising:

at least two fuel cells coupled together in flow communication such that at least one sealed passage extends between said at least two fuel cells;

a plurality of interconnects electrically coupling said at least two fuel cells together such that at least one interconnect extends between each adjacent pair of said at least two fuel cells; and

at least one fuel cell isolation device coupled in flow communication with each of said at least two fuel cells, said at least one fuel cell isolation device selectively positionable during operation of said fuel cell stack to electrically isolate at least one of said fuel cells from said remaining at least two fuel cells.

12. A fuel cell stack in accordance with Claim 11 wherein said at least one fuel cell isolation device is further selectively positionable to stop at least one of air flow and fuel flow to at least one fuel cell during fuel cell stack operation.

13. A fuel cell stack in accordance with Claim 11 wherein said at least one fuel cell isolation device is selectively positionable in sealing contact against a portion of a pair of adjacent interconnects.

14. A fuel cell stack in accordance with Claim 11 wherein said at least one fuel cell isolation device is selectively rotatable within said at least one hollow passage.

15. A fuel cell stack in accordance with Claim 11 wherein said at least one sealed passage comprises at least one of a fuel inlet, a fuel outlet, an air inlet, and an air outlet, said at least one fuel cell isolation device is coupled within said at least one sealed passage.

16. A fuel cell stack in accordance with Claim 11 wherein at least a portion of said at least one sealed passage has a substantially circular cross-sectional profile, said at least one fuel cell isolation device is substantially semi-circular.

17. A fuel cell stack in accordance with Claim 11 wherein said at least one fuel cell isolation device comprises an external surface, and at least one of a wire mesh, a metallic seal, and a brush coupled to said external surface for contacting at least one of said at least two fuel cells.

18. A fuel cell stack in accordance with Claim 11 wherein each of said at least two fuel cells comprises at least one keyway defined therein, said keyway facilitates positioning said at least one fuel cell isolation device relative to said at least two fuel cells.

19. A fuel cell stack in accordance with Claim 11 further comprising an actuator coupled to said at least one fuel cell isolation device, said actuator controls movement of said at least one fuel cell isolation device.

20. A fuel cell stack in accordance with Claim 11 further comprising at least one valve for selectively controlling movement of said at least one fuel cell isolator device through said valve and into at least one sealed passage.

21. A fuel cell stack in accordance with Claim 11 wherein said at least one fuel cell isolation device is formed integrally with at least one of said at least two fuel cells.

22. A method for assembling a fuel cell stack, said method comprising:

electrically coupling a first fuel cell to a second fuel cell such that at least one sealed passage extends between the first and second fuel cells; and

coupling at least one fuel cell isolation device within the at least one seal passage such that the at least one fuel cell isolation device is variably positionable to electrically isolate at least one of the first and second fuel cells during operation of the fuel cell stack.

23. A method in accordance with Claim 22 wherein electrically coupling a first fuel cell to a second fuel cell further comprises coupling an air source and a fuel source to the fuel cell stack.

24. A method in accordance with Claim 23 wherein coupling at least one fuel cell isolation device within the at least one seal passage further comprises coupling the at least one fuel cell isolation device within the at least one seal passage to enable at least one of air flow and fuel flow to be selectively stopped to at least one of the first and second fuel cells during operation of the fuel cell stack.

25. A method in accordance with Claim 22 wherein coupling at least one fuel cell isolation device within the at least one seal passage further comprises

rotatably coupling the at least one fuel cell isolation device within the at least one seal passage.

26. A method in accordance with Claim 22 wherein coupling at least one fuel cell isolation device within the at least one seal passage further comprises coupling the at least one fuel cell isolation device within the at least one seal passage such that selective movement of the at least one fuel cell isolation device causes at least one of a wire mesh, a wire brush, or a brush, extending from the at least one fuel cell isolation device to contact at least one fuel cell in sealing contact.

27. A method in accordance with Claim 22 further comprising coupling the at least one fuel cell isolation device to an actuator such that the actuator controls movement of the at least one fuel cell isolation device.

28. A method in accordance with Claim 22 further comprising coupling at least one valve to the fuel cell stack such that operation of the valve facilitates controlling movement of the at least one fuel cell isolation device.

29. A method for operating a fuel cell stack assembly including at least two fuel cells electrically coupled in series together, said method comprising:

determining a fault exists within an operating fuel cell stack assembly;

electrically isolating at least one of the fuel cells during operation of the fuel cell stack assembly; and

continuing operation of the fuel cell stack assembly with at least one fuel cell electrically isolated from the remaining fuel cells within the fuel cell stack assembly.

30. A method in accordance with Claim 29 wherein determining a fault exists further comprises detecting a cell failure through monitoring at least one of an operating temperature within the fuel stack, voltage generation, operating current, and pressure telemetry.

31. A method in accordance with Claim 29 wherein determining a fault exists further comprises determining that a fault exists by monitoring the stack performance rather than monitoring the voltage and/or performance of individual fuel cells within the fuel cell stack.

32. A method in accordance with Claim 29 wherein determining a fault exists further comprises selectively isolating each fuel cell within the fuel cell stack while continuously monitoring the stack performance.

33. A method in accordance with Claim 29 wherein determining a fault exists further comprises monitoring the performance of each individual fuel cell during fuel cell stack operation.

34. A method in accordance with Claim 29 wherein electrically isolating at least one of the fuel cells during operation further comprises selectively positioning at least one fuel cell isolation device within the fuel cell stack to electrically isolate at least one fuel cell from the remaining fuel cells.

35. A method in accordance with Claim 29 wherein electrically isolating at least one of the fuel cells during operation further comprises selectively positioning at least one fuel cell isolation device within the fuel cell stack to enable at least one of air flow and fuel flow to be selectively prevented to at least one of the fuel cells during operation of the fuel cell stack, without preventing flow to the remaining fuel cells operating within the fuel cell stack.

36. A method in accordance with Claim 29 wherein electrically isolating at least one of the fuel cells during operation further comprises selectively rotating at least one fuel cell isolation device within the fuel cell stack.

37. A method in accordance with Claim 28 wherein electrically isolating at least one of the fuel cells during operation further comprises actuating an actuator to selectively position at least one fuel cell isolation device within the fuel cell stack to electrically isolate at least one fuel cell from the remaining fuel cells.

38. A fuel cell isolation assembly for use with a fuel cell stack including at least two fuel cells, said fuel cell isolation assembly comprising:

a fuel cell isolation device configured to be positioned within a sealed passage extending between the two fuel cells; and

an actuator coupled to said fuel cell isolation device for controlling movement of said fuel cell isolation device such that said fuel cell isolation device is selectively positionable within the sealed passage during operation of the fuel cell stack to electrically isolate at least one of the fuel cells from the remaining fuel cells.

39. A fuel cell isolation assembly in accordance with Claim 38 wherein said fuel cell isolation device has a cross-sectional profile that substantially mirrors that of the fuel cell stack sealed passage.

40. A fuel cell isolation assembly in accordance with Claim 38 wherein adjacent fuel cells are separated within the stack by a distance, said fuel cell isolation device has a length that is longer than the distance defined between adjacent fuel cells.

41. A fuel cell isolation assembly in accordance with Claim 38 wherein the adjacent fuel cells within the fuel stack are electrically coupled together such that at least one interconnect extends between the pair of fuel cells, said fuel cell isolation device is further configured to electrically couple a pair of adjacent interconnects together.

42. A fuel cell isolation assembly in accordance with Claim 38 wherein said fuel cell isolation device comprises external surface, at least one of a wire mesh, a metallic seal, and a brush extends outwardly from said external surface.

43. A fuel cell isolation assembly in accordance with Claim 38 wherein said fuel cell isolation device comprises an external surface and a positioning projection extending outward from said external surface, said positioning position configured to facilitate positioning said fuel cell isolation device relative to the fuel stack.